



Tap Water Quality and Infrastructure Discussion Guide for Investigation of Potential Water-Associated Infections in Healthcare Facilities

Available from: www.cdc.gov/hai/prevent/water-management.html

Purpose: For CDC and health department to use as a discussion guide when consulting with healthcare facilities in situations where there is concern for transmission of waterborne pathogens. Patient exposures may either be direct (aerosols, splash, bathing, ingestion, ice use, contaminated devices with water reservoirs, etc.) or indirect (contaminated surfaces, reprocessed medical devices, drugs, healthcare personnel, etc.). Examples of infections might include surgical site, injection site, or bloodstream infections due to nontuberculous mycobacteria; *Pseudomonas aeruginosa* infections among NICU or burn patients; Legionnaires' disease.

1. Drinking Water System Name (Public or Private): _____
2. If Public Water System, EPA ID Number: _____
To find your EPA ID Number, use [SDWIS Search](https://www.epa.gov/enviro/sdwis-search) (<https://www.epa.gov/enviro/sdwis-search>).
3. Water Source (*check*):
 - a. ☐ Surface water
 - b. ☐ Ground water
 - c. ☐ Blended surface and ground
4. ☐ Y ☐ N Does the drinking water provider maintain a disinfectant residual?
If Yes:
 - a. What does the provider use as a secondary disinfectant; this would be residual in the main public water distribution system?
 - ☐ Free available chlorine
 - ☐ Monochloramine
 - b. What is the disinfectant residual before it enters the building? _____ mg/L (ppm)
5. ☐ Y ☐ N Have there been recent water disruptions such as a water main break or boil water advisory?
If Yes, briefly describe including dates:
6. ☐ Y ☐ N Does your facility perform supplemental disinfection?
If Yes (*check all that apply*)
 - a. If facility wide, where in the plumbing system is supplemental disinfection performed?
 - ☐ Incoming water (for hot and cold-water distribution)
 - ☐ Hot water distribution only

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- b. ☐ Other area or point of use, if so describe _____
- c. Disinfection strategy (*check all that apply*)
- ☐ Copper/Silver ionization
 - ☐ Free Chlorine (Cl₂, hypochlorite generator, mixed oxidants, bleach injection, etc)
 - ☐ Chlorine dioxide (ClO₂)
 - ☐ Germicidal Ultraviolet (UV) light
 - ☐ Thermal flushing (if so, specify flush temperature, _____ °C or _____ °F)
 - ☐ Point of use filtration: _____

If applicable, list locations and fixture type(s), such as showers or sinks, where point of use filters are used:

☐ Other: _____

- d. For each type of chemical disinfectant used, what is the:
- Target residual concentration? _____ mg/L
- ☐ Mean or ☐ Median measured concentration? _____ mg/L

7. Facility characteristics:

If investigating a Legionella outbreak there may be other water sources (eg., cooling towers) associated with the facility see: [Legionella Materials](https://www.cdc.gov/legionella/resources/materials.html) (https://www.cdc.gov/legionella/resources/materials.html) and [Legionella Environmental Assessment Form \[PDF - 15 pages\]](https://www.cdc.gov/legionella/downloads/legionella-environmental-assessment.pdf) (https://www.cdc.gov/legionella/downloads/legionella-environmental-assessment.pdf)

- a. Building age in years _____ or year constructed _____
- b. ☐ Y ☐ N Have there been prior outbreaks associated with water in the facility?
- If yes, which organism(s) and unit(s)?

- c. ☐ Y ☐ N Water storage (eg., tanks for emergency supply) on site
- If yes, Number of storage tanks _____
- d. Number of incoming water entry points _____
- e. ☐ Y ☐ N Does your facility have cooling towers
- f. ☐ Y ☐ N Does your facility have a centralized humidification system
- g. ☐ Y ☐ N Recirculating hot water system
- If yes, Number of recirculating loops _____
- ☐ Y ☐ N Is temperature monitored at return to hot water tank
- h. ☐ Y ☐ N Is there water stored on site (eg., storage tanks)
- If yes, Water storage capacity _____ gallons
- If yes, Frequency of water turnover in the tank _____ per _____
- i. Bed Occupancy rate _____
- j. Mean cold water temperature at point of use? _____

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- k. Mean hot water temperature at point of use? _____
- l. What is the time to hot water temperature at point of use? _____ mins _____ secs
8. Fixtures and devices that use water:
- a. Sinks:
- ☐ Y ☐ N Do any sinks in patient care areas have aerators and flow restrictors in place?
 - ☐ Y ☐ N Do all sinks in patient care areas have drains offset from faucet stream?
 - ☐ Y ☐ N Are there barriers between sinks and adjacent medication preparation areas?
 - ☐ Y ☐ N Is a policy followed to keep all patient supplies >3 feet away from sinks that do not have barriers?
- b. Hoppers:
- ☐ Y ☐ N Do all hoppers have a cover that are routinely closed before flushing?
 - ☐ Y ☐ N If no cover, is there a door that is routinely closed before flushing and that separates patients from the hopper?
- c. Toilets:
- ☐ Y ☐ N Do all toilets have a cover that are routinely closed before flushing?
 - ☐ Y ☐ N If no cover, is there a door that is routinely closed before flushing and that separates patients from the toilet?
 - ☐ Y ☐ N Are toilets present in the ICU?
- d. ☐ Y ☐ N Is hydrotherapy equipment (e.g., pools, whirlpools, whirlpool spas, hot tubs, physiotherapy tanks) present in the facility?
- What types of equipment are used:
- ☐ Y ☐ N Hubbard tanks
 - ☐ Y ☐ N Whirlpool baths
 - ☐ Y ☐ N Large pools (not drained, cleaned and disinfected after each patient use)
 - ☐ Y ☐ N Are baths used for wound debridement
 - ☐ Y ☐ N Are baths (whirlpools) used in other departments (outside of PT or burn unit)
 - ☐ Y ☐ N Is a disinfectant residual (eg., chlorine, Bromine or Iodine) maintained in all tanks, tubs and pools during patient use?
- e. ☐ Y ☐ N Are birthing tanks used in labor and delivery?
- f. ☐ Y ☐ N Are decorative water features (e.g., fountains, fish tanks) present in the facility?
- g. ☐ Y ☐ N Are humidifiers present in the facility?
9. ☐ Y ☐ N Is there a water management program in place? See the [Healthcare Facility Water Management Program Check List \[PDF - 4 pages\]](https://www.cdc.gov/hai/pdfs/Water-Management-Checklist-P.pdf) (<https://www.cdc.gov/hai/pdfs/Water-Management-Checklist-P.pdf>)
(If yes, continue; If no stop here)
- a. ☐ Y ☐ N Do you have a water management team for your facility?
- ☐ Y ☐ N Are members identified by name?
 - ☐ Y ☐ N Are roles and responsibilities clearly defined?
- b. ☐ Y ☐ N Do you have a flow diagram of the building water system?
- ☐ Y ☐ N If Yes, has the system been assessed for dead legs?

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- c. ☐ Y ☐ N Do the written facility policies and procedures include the frequency, method, and personnel responsible for cleaning of fixtures and devices that use water?
- d. ☐ Y ☐ N Is there a documented environmental hazard analysis?
- e. ☐ Y ☐ N Has an infection control risk assessment been performed for the facility for potential water exposures?
(For the affected unit(s)/ward(s), is there a detailed accounting of these applications/exposures) _____
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- f. ☐ Y ☐ N Is a written summary available for various end uses of water and the ways in which patients, visitors, and staff might be exposed?
- g. ☐ Y ☐ N Are control points identified (places where water quality team have identified to be monitored and controlled)?
- h. What parameters are being monitored (not all of these may require monitoring)?
Check all that apply
- ☐ Disinfectant residual
- ☐ Water temperature
- ☐ Hot water return
- ☐ Hot water at point of use
- ☐ Cold water at point of use
- ☐ Heterotrophic plate count
- ☐ Turbidity
- ☐ pH
- ☐ other (describe) _____
- i. ☐ Y ☐ N Is there a routine premise plumbing supply flushing program in place?
- j. ☐ Y ☐ N Have procedures been put in place to confirm that the program (initially and ongoing) is being implemented as designed (verification)?
- k. ☐ Y ☐ N Is your water management program effective in controlling the hazardous conditions throughout the building (validation)?
Validation may include: testing for the hazard (opportunistic pathogens of premise plumbing), routine clinical surveillance for Legionnaire's disease and other water-associated organisms

Appendix: Opportunistic Pathogens of Premise Plumbing

If clusters of infections due to these organisms occur, suspect water as a potential source.

Selected Examples:

Gram negative bacteria

- *Pseudomonas aeruginosa*
- *Pseudomonas putida*-*P. fluorescens*
- *Burkholderia cepacia* complex (*B. cepacia*, *B. cenocepacia*, at least 8 other genomospecies)
- *Cupriavidus (Ralstonia) pauculus*
- *Herbaspirillum*
- *Methylobacterium* spp.
- *Ralstonia pickettii*, *Ralstonia mannitolilytica*
- *Sphingomonas paucimobilis*, *Sphingomonas mucosissima*, other *Sphingomonas* spp
- *Stenotrophomonas maltophilia*
- *Acinetobacter baumannii*, *A. calcoaceticus*
- *Alcaligenes xylosoxidans*, *A. faecalis*,
- *Aeromonas hydrophila*, *Aeromonas* spp
- *Elizabethkingia anaophelis*, *E. meningosepticum*
- *Legionella pneumophila*

Non-fecal coliforms

- *Enterobacter cloacae*
- *Klebsiella* spp
- *Pantoea agglomerans*
- *Rahnella aquatilis*
- *Serratia liquifaciens*, *Serratia marcescens*

Nontuberculous mycobacteria (NTM or Environmental Mycobacteria)

- *M. abscessus* clade (*M. abscessus*, *M. boletii*, *M. massiliense*)
- *M. chelonae*
- *M. mucogenicum* clade (*M. mucogenicum*, *M. phociacum*)

- *M. fortuitum* clade (*M. fortuitum*, *M. cosmeticum*, *mageritense*, *M. porcinum*, *M. septicum*)
- *M. immunogenum*
- *M. smegmatis* clade (*M. goodii*, *M. wolinskyi*)
- *M. aurum*
- *M. simiae*
- *M. avium* complex (*M. avium*, *M. intracellulare*, *M. chimera*, *M. avium* ss *hominissuis*, *M. columbiense*)
- *M. scrofulaceum*
- *M. parascrofulaceum*
- *M. xenopi*
- *M. arupense*
- *M. kansasii*
- *M. haemophilum*
- *M. nonchromogenicum* clade (*M. nonchromogenicum*, *M. triviale*, *M. terrae*)
- *M. gordonae* (only among patients with severe immune deficiency)

Other bacteria/actinomyces

- *Microbacterium* spp
- *Tsukamurella* spp
- *Rhodococcus equi*, *Rhodococcus* spp
- *Gordonia* spp

Fungi

- Yeasts (eg. *Candida parapsilosis*, *C. tropicalis*)
- *Aspergillus fumigatus*, *A. niger*
- *Fusarium* spp
- *Exophiala* spp.

Protozoa

- *Acanthamoeba* spp
- *Vermamoeba vermiformis*
- *Naegleria* spp